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ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GRO--ETC F/6 6/17
COLD REGIONS PERFORMANCE TEST OF SNOWSHOES. (U)

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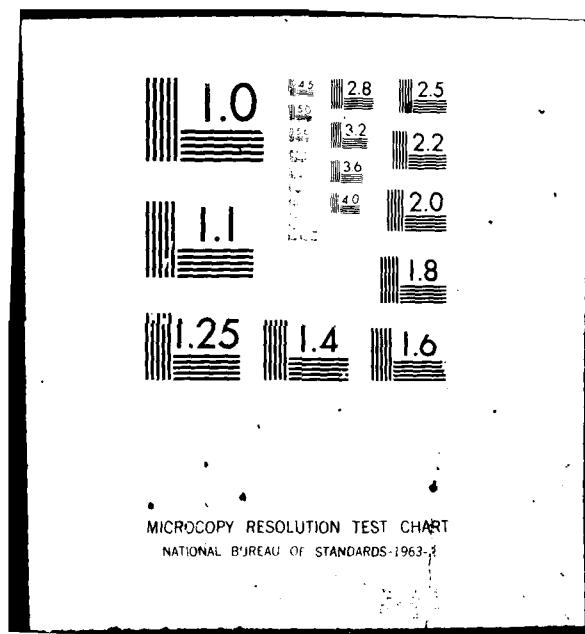
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READ INSTRUCTIONS
BEFORE COMPLETING FORM

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This TOP contains procedures and data requirements for evaluating snowshoes. Procedures are presented for obtaining data to be used in evaluating snowshoe structural strength, compatibility with other military equipment, and functional characteristics for military use.		

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U.S. ARMY TEST AND EVALUATION COMMAND
TEST OPERATIONS PROCEDURE

DRSTE-RP-702-109
Test Operations Procedure 10-2-509
AD No.

5 May 1980

COLD REGIONS PERFORMANCE TEST OF SNOWSHOES

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1. SCOPE. The objective of this Test Operations Procedure (TOP) is to outline data requirements and procedures to be used in evaluating snowshoes. This TOP contains methods for obtaining data to evaluate snowshoe structural strength, compatibility with other military equipment, and functional characteristics for military use. Limited design specification on snowshoe performance favors comparisons of test item to standard item performance data obtained under identical conditions.

2. FACILITIES AND INSTRUMENTATION.

2.1 Facilities.

2.1.1 Test Courses. All test courses should be located in terrain that is protected from winds so the snow will not be blown away. These courses should be wide enough to allow travel of several test personnel abreast.

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2.1.1.1 Test courses with inclines that vary between 8 and 36 percent. The minimum length of the inclines shall be 50 meters.

2.1.1.2 A test course approximately 4 kilometers long that contains no inclines longer than 10 meters of greater than 8 percent slope.

2.1.1.3 A test course of approximately 1 kilometer in length that contains brush at least 1 foot above the surface of the snow.

2.1.2 A heated enclosure suitable for weighing and making other measurements on snowshoes and for conducting interviews.

2.2 Instrumentation.

<u>Item</u>	<u>Range</u>	<u>Minimum Accuracy</u>
Tape measure	30 m (100 ft)	<u>±1%</u>
Tape measure	182 cm (72 in)	<u>±1%</u>
Scale (weight)	4.5 kgs (10 lbs)	<u>±1%</u>
Scale (weight)	115 kgs (250 lbs)	<u>±1%</u>
200 lb sled with towing harness (Ahkio)	3 each (sets)	N/A
Ten-man tent group	3 each	N/A
Parachutes with combat equipment	12 each	N/A
Inf. combat equipment	12 each	N/A
Thermometer	-45°C to 5°C (-50°F to 40°F)	<u>±1°C</u> <u>±2°F</u>
Snow probe	1 m (3 ft)	<u>±1%</u>
Anemometer	0 to 80 kmph (0 to 50 mph)	<u>±3%</u>
Inclinometer	0 to 20 degree	<u>±2%</u>

<u>Item</u>	<u>Range</u>	<u>Minimum Accuracy</u>
Planimeter	N/A	<u>±1%</u>
VB boots (pair)	13 wide	N/A
VB boots (pair)	5 narrow	N/A
Ski-Mountain Boot (pair)	13 wide	N/A
Ski-Mountain Boot (pair)	5 narrow	N/A
Standard Combat Boot (pair)	13 wide	N/A
Standard Combat Boot (pair)	5 narrow	N/A

3. PREPARATION FOR TEST

3.1 Facilities

3.1.1 Test Course. Insure test courses have been measured and marked for distance and that all inclines have been measured and marked.

3.1.2 Inspect the heated enclosure to insure that it has adequate space for marking, weighing, and measuring the snowshoes and that sufficient office furnishings are available for conducting interviews.

3.1.3 Field Shelter. Insure that a heated enclosure is available near the test courses that is adequate for conducting interviews and completing questionnaires.

3.1.4 Insure that all required items of instrumentation are available and calibrated.

3.2 Personnel. Individuals participating in the test shall be briefed on the objectives of the test, the procedures to be followed in accomplishment of the objectives, test participant's responsibility during testing, and the approximate time required to complete the test.

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3.3 Test Item

3.3.1 Inspect shipping containers for physical damage. Photograph and record a narrative description of all observed damages.

3.3.2 Unpack the snowshoes from the shipping containers and inspect for damage. Photograph and record a narrative description of all damaged test items. If shipping containers were damaged, investigate the possibility that damage to the test items could be attributable to the shipping containers. Insure that all test items have been received. Dispose of unusable damaged items as instructed by the test directive or test sponsor. Insure that a unique identification number is permanently marked on each test item pair. The location of the identification number will be easily visible and consistent and not degrade the functional integrity of the test item.

3.4 Data Required.

3.4.1 Test Course. Location, type of surface, percent inclination and length of each incline, and total length of course.

3.4.2 Instrumentation. Serial number, accuracy, and calibration date of each instrument to be used in the test.

3.4.3 Personnel. Record the name, MOS, height, weight, and boot size of each test participant.

3.4.4 Test Item. Record a general description of the test item, the total number to be tested, and the number received in damaged condition. Record the identification number of each item to be tested. Photograph a typical test item for illustration and inclusion in the final report.

4. TEST CONTROLS

4.1 A minimum of 12 pairs of snowshoes will be used when beginning the tests.

4.2 All test participants shall be proficient in the use of snowshoes before testing begins.

4.3 Meteorological data from a central location will be used for determining and recording climatic conditions throughout the test. This meteorological data will be supplemented by local temperatures taken at the test location.

4.4 A binding once installed, shall remain with that snowshoe throughout the conduct of the test. Broken bindings shall be replaced with a serviceable binding of the same type and the change of binding recorded in the test data.

4.5 Unless otherwise directed, functional suitability testing shall be performed in ambient temperatures below -10°C. At least 4 kilometers will be traveled when the temperature is below -40°C.

5. PERFORMANCE

5.1 Physical Characteristics

5.1.1 Method. All test items shall undergo a thorough inspection for damage such as cracked or bent frames, loose or frayed coating on webbing, etc.

5.1.1.1 Each snowshoe shall be weighed. If the snowshoe includes a binding, when possible the snowshoe and binding shall be weighed separately and thereafter the binding affixed to the snowshoe. All weights shall be recorded.

5.1.1.2 The length and width of each snowshoe shall be measured at the maximum points of both parameters. All measurements shall be recorded by identification number for each snowshoe.

5.1.1.3 The total area of at least three of the snowshoes shall be measured and recorded. If there is a difference of more than 3 percent in measured area between any two snowshoes, the area of all the snowshoes will be measured. Area will be measured by tracing the outline of the snowshoe on a piece of paper and using a planimeter (preferable) or grid squares on the paper to determine the area covered by the snowshoe.

5.1.1.4 The height of the shovel on each snowshoe shall be measured by placing the snowshoe on a flat surface, shovel up, and measuring the maximum height of the underside of the snowshoe frame at the toe. This measurement shall be recorded in the test data records for each snowshoe.

5.1.1.5 The width and length of the window in each snowshoe shall be measured. These measurements shall be made on a line parallel with the axis of the snowshoes. These measurements shall be recorded for all snowshoes.

5.1.2 Data Required

Weight
Length
Width
Area
Window size
Shovel height

5.2 Structural Strength. A minimum of three snowshoes shall be used in each of the tests described in this paragraph. A flat smooth surface large enough to encompass the entire snowshoe will be selected. Two supports approximately 5 centimeters (2 in by 2 in) square and 46 centimeters (18 in) long shall be used to support the snowshoes. At least one test shall be performed immediately after the snowshoe has been cold soaked to $40\frac{1}{2}^{\circ}\text{C}$ and is still near that temperature.

5.2.1 Method. A test participant that weighs approximately 90 kilograms (200 pounds) or more shall be selected for these tests. The test participant shall don the appropriate military pack. Weight shall be added to the pack until the combined weight of the test participant and the pack and contents reach 145 kilograms (320 pounds). In the following tests, the test participant shall place his entire weight, at the normal support position on the snowshoe.

Note: The 90-kilogram or heavier test participant is desirable to support the total weight of 145 kilograms. The 145 kilograms are derived from the weight of a 95th percentile infantry man who weighs 90 kilograms, adding the cold weather fighting load, less snowshoes, of 30.4 kilograms (68 pounds) and increasing this by approximately 20 percent to simulate the dynamic pressures incurred while walking.

5.2.1.1 The supports shall be placed on the flat surface under both sides of the frame of the snowshoe parallel with the long axis at a position which will allow a test participant to balance, on one foot, on the snowshoe at the normal foot position. The height, above the flat surface, at the center of the cross support, located immediately in front of the window of the snowshoe, shall be measured and recorded. The man with equipment shall then place his total weight on the snowshoe by placing one foot at the normal foot position and transferring his weight to that foot. The height, above the flat surface, at the center of the cross support, located immediately in front of the window of the snowshoe shall be measured and recorded.

The test participant shall remove his weight from the snowshoe and the height above the flat surface at the same location as previously measured shall be recorded. Paragraph 5.2.1.1 shall be performed a total of three times using three different snowshoes.

5.2.1.2 On this test, the supports shall be placed on the flat surface in a position so they will be parallel with the short axis of the snowshoe. One support shall be placed where the rear edge is 1.25 centimeters (0.5 inches) in front of the end of the trail of the snowshoe. The other support shall be placed so the front edge is 1.25 centimeters behind the point where the shovel begins to curve upward. The height, above the flat surface, of both sides of the frame of the snowshoe shall be measured and recorded at 15 centimeter (6 in.) intervals along the frame. The measured height shall begin at the front support. Height shall be recorded as, right or left, 15, 30, centimeters etc. from the front support. The height shall be measured before, during, and after the snowshoe has supported the test participant and equipment. Paragraph 5.2.1.2 shall be performed a total of three times using three different snowshoes.

Note: If frame of snowshoe touches the flat surface during this test, increase the height of the supports.

5.2.2 Data Required

Distance between supports
Heights of frame (as required in para 5.2.1.1 and 5.2.1.2)
Weight of test participant
Weight of equipment (pack)
Description of failures with photographs

5.3 Compatibility

5.3.1 Method

5.3.1.1 Bindings. Standard military snowshoe bindings shall be used for this test. If special bindings have been furnished with the snowshoes for test, then the tests contained in the following subparagraphs shall be performed using both bindings.

5.3.1.1.1 Review the binding installation instructions for both the snowshoe and binding. Install the bindings on the snowshoes in accordance with the installation instructions. Inspect the installation to ensure that they are securely fastened. Record a narrative

description and photographically illustrate problems that prohibit the fastening of the bindings to the snowshoes.

5.3.1.1.2 Fasten a pair of size 13 wide VB boots (right and left) onto a set of the snowshoes. Record a narrative description and photographically illustrate problems which prohibit the fastening of the boot to the snowshoe. If a problem exists determine if it is attributable to the binding or the snowshoe and record the findings.

5.3.1.1.3 Fasten a pair of size 5 narrow VB boots (right and left) onto a set of the snowshoes. Record a narrative description and photographically illustrate problems which prohibit the fastening of the boots to the snowshoe. Determine if this problem is attributable to the binding or the snowshoe and record findings.

5.3.1.1.4 Select four test participants that wear VB Boots of size 10 or larger, four that wear size 6 through 9 and four that wear size 5 or 6. These test participants shall don the snowshoes. Each snowshoe shall be checked to ensure the boots are securely fastened to the snowshoes. The test participants shall then walk 200 meters through snow that supports the snowshoe a minimum of 7.5 centimeters above the surface of the ground. Each binding installation will be observed to determine if it offers a secure fastening of the boot to the snowshoe. The window of each snowshoe will be observed to determine if the window is of sufficient dimensions to allow the toe of the boot freedom of movement through the window. Record a narrative description and photograph problems which prevent the use of the boot with the snowshoe.

5.3.1.1.5 Repeat paragraph 5.3.1.1.2 through 5.3.1.1.4 using the standard ski-mountain boots in place of the VB boots.

5.3.1.1.6 Repeat paragraph 5.3.1.1.2 through 5.3.1.1.4 using the standard combat boots in place of the VB boots.

5.3.1.2 Ten test participants shall assemble a cold regions combat field load with individual combat equipment. The snowshoes will be fastened to the field load using the method prescribed by the appropriate field manual. The field load will be inspected to determine if the snowshoes can be securely fastened to the field load. Record a narrative description and photographically illustrate any condition which exists, attributable to the snowshoes, that prohibit fastening the snowshoes to the field load. The test participants shall form into a squad with the field load, including snowshoes, and conduct a foot march of 4 kilometers. Record a narrative description and

photograph conditions, attributable to the snowshoes, that prohibit packing the snowshoes with the field load.

5.3.1.3 A total of 10 paratroopers will jump with the snowshoes two times each while exiting from U.S. Air Force assault type aircraft. Parachutists will wear the cold-dry uniform and carry their individual weapons and All Purpose Light Weight Individual Carrying Equipment (ALICE). The ALICE, with heavy bag, will include the combat field load (approximate weight 17 kg) as prescribed in FM 31-71. Drops will be conducted from an elevation of 400 meters at ground windspeeds of 10 knots or less. The snowshoes shall be affixed to the field load by the method prescribed by the appropriate field manual. The snowshoes will be inspected to ensure they can be securely fastened to the field load. The test participants shall then don the field load with individual equipment and parachutes. The installation of the snowshoes on the field load shall be inspected. Record a narrative description and photographically illustrate conditions which prohibit or inhibit normal combat jumps with the snowshoes fastened to the pack. If no conditions exist which prohibit a standard combat jump, the 10 test participants shall perform a standard combat jump. A narrative description of difficulties encountered during the jump shall be recorded.

5.3.2 Data Required

Narrative description of problems of incompatibility, with photographs.

Kilometers marched

Paratrooper jumps made

5.4 Functional Suitability. Minimum snow depth during conduct of test described in this paragraph shall be 25 centimeters (10 in.). Snow at the test site shall be classified during each test using the method described in the Methodology Report "A Study of Snow Classification Systems" USATECOM Project No. 9-CO-008-000-016, dated 29 July 1974, Appendix C. The temperature of the snow shall be measured 6 inches below the surface of the snow and recorded for each test. Prior to beginning each of these tests, all snow, ice and other foreign materiel will be removed from the snowshoe. Bindings shall be inspected to insure that all bindings are identically installed according to the method directed by the appropriate military or manufacturer's instructions. Unless otherwise specified, all tests shall begin below -10°C (15°F). The attachment of the bindings to the boots shall be inspected for proper fastening before test.

5.4.1 Method. The snowshoes shall be evaluated in performing the test in each of the following subparagraphs independently although not necessarily in the order they are written. After the performance of each test, test participants shall proceed to a warm shelter for interviews and completion of questionnaires (sample included at appendix A). The data supplied on the questionnaire shall relate to a particular performance subparagraph. At the time of the interviews, difficulties experienced, attributable to the snowshoes shall be recorded (e.g. could not climb 20 degree slope pulling ahkio).

Note: For the purpose of conducting the test described in the following subparagraphs, soft snow shall mean snow conditions that allow sinkage of the snowshoe a minimum of 15 centimeters (6 in) below the surface of the snow, crusted snow shall mean conditions that allow sinkage of the snowshoe a maximum of 10 centimeters (4 in) below the surface of the snow. These conditions should be determined using a 95th percentile man wearing the standard military snowshoe.

5.4.1.1 The test participants shall be formed into squad size groups for conducting the test detailed in the following subparagraphs. Each subtest shall be performed twice. The first time shall be without a load and the second time shall be with full cold regions combat field load and individual combat or simulated combat equipment.

5.4.1.1.1 Climbing Capability Soft Snow. One kilometer (0.62 mi) climbing inclines, that vary between 8 and 36 percent, through soft snow.

5.4.1.1.2 Climbing Capability Crusted Snow. One kilometer climbing, inclines, that vary between 8 and 36 percent, through crusted snow.

5.4.1.1.3 Descending Capability Soft Snow. One kilometer descending inclines, that vary between 8 and 36 percent, through soft snow.

5.4.1.1.4 Descending Capability Crusted Snow. One kilometer descending inclines, that vary between 8 and 36 percent, through crusted snow.

5.4.1.1.5 Side Slope Traversal Soft Snow. One kilometer traversing across inclines, that vary between 8 and 36 percent, through soft snow.

5.4.1.1.6 Side Slope Traversal Crusted Snow. One kilometer traversing across inclines, that vary between 8 and 36 percent, through crusted snow.

5.4.1.1.7 Characteristics Level Terrain Soft Snow. Four kilometers over terrain that has no inclines of over 8 percent longer than 10 meters, through soft snow.

5.4.1.1.8 Characteristics Level Terrain Crusted Snow. Four kilometers over terrain, that has no inclines of over 8 percent longer than 10 meters, through crusted snow.

5.4.1.1.9 Characteristic Brush. Two kilometers through brush that protrudes above the surface of the snow a minimum of 30 centimeters (1 ft). Snow may be either crusted or soft or a combination of the two.

5.4.1.2 Towing. Test participants shall be organized into four-man teams, each team shall perform the tests described in the following sub-paragraphs. Test participants shall perform the test carrying full cold regions combat field load and individual combat or simulated combat equipment and pulling an ahkio loaded with a 10-man tent group.

5.4.1.2.1 Climbing Characteristics Soft Snow. One kilometer climbing inclines, that vary between 8 and 36 percent, through soft snow.

5.4.1.2.2 Climbing Characteristics Crusted Snow. One kilometer climbing inclines, that vary between 8 and 36 percent, through crusted snow.

5.4.1.2.3 Level Terrain Characteristics, Soft Snow. Four kilometers over terrain, that has no inclines of over 8 percent longer than 10 meters, through soft snow.

5.4.1.2.4 Level Terrain Characteristics, Crusted Snow. Four kilometers over terrain, that has no inclines of over 8 percent longer than 10 meters, through crusted snow.

5.4.1.3 Characteristics in Wet Snow. Test participants shall travel 4 kilometers through soft snow in temperatures above 0°C (32°F). This test will be performed without field load or towing.

5.4.2 Data Required

Completed Questionnaires
Type of snow
Depth of Snow
Kilometers traveled (by type terrain and snow conditions)
Combat load weight
Ahkio weight (loaded)
Task attempted which could not be performed

6. DATA REDUCTION AND PRESENTATION

6.1 Preoperational Inspection. The preoperational measurements shall be tabulated and entered on the data sheet provided in Appendix A. This data shall be used to substantiate conclusions derived from the questionnaires completed during the functional suitability test. Comments concerning problems with the snowshoes shall be categorized and recorded for inclusion in the final report.

6.2 Structural Strength. Structural strength data shall be entered on the data sheet provided in Appendix A. The deformation of the snowshoe during load and permanent deformation after the load is removed is calculated by subtracting these heights from the height before the load was applied to the snowshoe. Structural strength data shall be used to substantiate catastrophic failures or physical weaknesses of the snowshoe observed during performance test.

6.3 Compatibility. Photographs and a narrative description of problems of compatibility shall be categorized and included with the test data.

6.4 Functional Suitability. Functional suitability shall be categorized into four different functions; climbing, descending, side slope, and level terrain. The categories shall be separated into two different snow conditions, soft and crusted. The numerical response to each question in the questionnaire shall be tabulated for each category in the two snow conditions. The five questions with answers of either yes or no shall be tabulated on data sheets for analysis.

Recommended changes to this publication should be forwarded to Commander, US Army Test and Evaluation Command, ATTN: DRSTE-AD-M, Aberdeen Proving Ground, MD 21005. Technical information may be obtained from the preparing activity: Commander, US Army Cold Regions Test Center, ATTN: STECR-TD, APO Seattle 98733. Additional copies are available from the Defense Technical Information Center, Cameron Station, Alexandria, VA 22314. This document is identified by the accession number (AD No.) printed on the first page.

APPENDIX A - INSTRUCTIONS FOR COMPLETING QUESTIONNAIRE

1. The accompanying questionnaire is furnished as a sample, and may require modification for the specific test item. Guidance in the preparation of questionnaires is contained in TECOM pamphlet 602-1.
2. The questionnaire is to be completed by the test participant, while in a warm enclosure, after the completion of each test (e.g., soft snow, upgrade, without pack).
3. The test data records describing the general conditions of the test shall be completed and attached to the completed questionnaires for insertion into the test records.
4. Questions 3 and 4 are primarily directed at negotiating inclines and traversing inclines respectively. Answers to these questions that imply poor performance during other conditions of testing should be verified by personal interviews and the reasons or conditions of poor performance documented.
5. Questions 8 through 11 of the questionnaire should be answered after approximately 10 percent, 50 percent, and at the conclusion of testing.
6. The following instructions will be given to test participants before starting the questionnaire:
 - a. Fill in your name and date.
 - b. Read the possible answers to the questions before starting to read the question.
 - c. Read each question and place the appropriate number, that represents your evaluation of the snowshoes, in the blank space, provided for that question.
 - d. The answers to each question is to be based upon a specific test.

Note: Test officers expand if necessary.

TEST DATA RECORDS

Date _____

Test _____

Distance Traveled: _____

Location: _____

Snow Depth: _____

Temperature (Air): _____

Snow Surface data (as defined and measured in accordance with CRTC
Memo 70-9, dated 10 September 1976).

Temperature (15 cm below surface) _____

Snow Surface Condition _____

Crystal Classification _____

Subjective Hardness _____

Wetness _____

SAMPLE QUESTIONNAIRE

Name _____ date _____

<u>Number</u>	<u>Answer</u>
6	Excellent
5	Very Good
4	Adequate
3	Not Quite Adequate
2	Poor
1	Very Poor

The following questions shall be answered with one of the above numbers corresponding to your selection of an answer.

1. How do you rate the snowshoe for keeping you from sinking in the snow? Comments, if any _____
2. How do you rate the snowshoe for remaining pointed in the direction of travel? Comments, if any _____
3. How do you rate the snowshoe for traction in the direction of travel? Comments, if any _____
4. How do you rate the snowshoe for traction in the lateral direction (e.g. snowshoe sliding to the side)? Comments, of any _____
5. How do you rate the snowshoe for ease of turning? Comments, if any _____
6. How do you rate the snowshoe for shedding snow while walking? Comment if any _____

The following questions shall be answered Yes or No. _____

7. Was the binding responsible for giving a YES NO poor rating on any of the above questions? If yes, explain _____

8. Is the snowshoe too wide? YES NO
If yes, explain _____

9. Is the snowshoe too long? YES NO
If yes, explain _____

10. Is the window of the snowshoe too small? YES NO
If yes, explain _____

11. Is the snowshoe too heavy? YES NO

SNOW SURFACE CLASSIFICATION

1. Snow Surface Conditions

	<u>Symbol</u>
Wavy - wave like	Sb
Concave furrows - crescent shaped	Sc
Convex furrows - inverted concave furrows	Sd
Random furrows - no pattern	Se

2. Crystal Classification

New snow - fresh, original crystals	Fa
Old snow - granular, less than 2 mm	Db
Old snow - granular, more than 2 mm	Dd
Depth hoar - cup-shaped, lenses, 3-10 mm	De

3. Subjective Hardness Test

Very soft - back of hand	Ka
Soft - four fingers	Kb
Medium soft - two fingers	Kcs
Hard - pencil	Kd
Very hard - knife	Ke

(Must wear gloves for test. Symbol recorded when the snow profile can be penetrated by one object but not the next larger object.

4. Wetness

Dry - snowball cannot be made	Wa
Moist - no water, but snowball can be made	Wc
Wet - obviously contains liquid water	Wd
Slushy - water can be pressed out	We

Must wear gloves for test.

Physical Characteristics Data Sheet

Snowshoe		Shovel		Window		
ID no.	Weight	Length	Width	Height	L W	Area

STRUCTURAL STRENGTH DATA SHEET

SNOWSHOE ID NO.	CENTER SUPPORT (CENTER)	HEIGHT ABOVE SURFACE																						
		15			30			45			60			75			90			105				
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C		
	R																							
	L																							
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A-Measured height before load applied.
 B-Measured height during application of load
 C-Measured height after load removal
 R-Right side of snowshoe facing forward
 L-Left side of snowshoe facing forward

FUNCTIONAL SUITABILITY
 TERRAIN CONDITIONS _____
 () Without Load
 () With Load
 () With Load and Ahkio
 QUESTIONNAIRE RATINGS

Test Participant

QUESTION NO.	CONDITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Sinking in SOFT snow.	CRUSTED													
2.	Pointing SOFT in direction of travel.	CRUSTED													
3.	Traction SOFT in direction of travel.	CRUSTED													
4.	Traction SOFT in lateral direction.	CRUSTED													
5.	Ease of turning.	CRUSTED													
6.	Shedding SOFT snow while walking.	CRUSTED													

Note: 1. Terrain conditions shall be uphill, downhill, sidehill, and level ground.
 2. Question number refer to questions 1 thru 6 on questionnaire.

APPENDIX B - COLD WEATHER UNIFORMS AND
SUPPLEMENTAL FIGHTING AND EXISTENCE LOADS, AND AHKIO LOAD
COLD WEATHER UNIFORMS

The year-round temperature variation peculiar to the cold regions prohibits the prescribing of a particular uniform for any season. The clothing which is comfortable at -45°C becomes uncomfortable at -25°C, and vice versa. Since a large fluctuation is experienced on an hour-by-hour, day-by-day basis, some degree of flexibility in uniform requirements is necessary.

The cold-wet uniform is designed to afford maximum protection against the hazards of changing temperatures, rain, wet snow, mud, and slush of a cold-wet environment.

The cold-dry uniform is designed to provide protection against the hazards of extreme temperatures, high winds, and snow of a cold-dry environment. As indicated below, the cold-wet uniform is part of the cold-dry uniform. The cold-wet uniform provides the inner insulating components of the cold-dry uniform. Progressing from cold-wet to cold-dry is accomplished by adding more insulation in the form of additional outer garments.

The necessary clothing components of the cold weather uniforms are worn as defined in TM 10-275, DA, Cold Weather Clothing and Sleeping Equipment, dated April 1968 as amended by current Supply Bulletins and 172d Infantry Brigade (Arctic) Directives.

<u>Item</u>	<u>Cold-Wet</u>	<u>Cold-Dry</u>
a. Undershirt man, 50% cotton, 50% wool, full sleeve.	X	X
b. Drawers cold weather man, 50% cotton, 50% wool, knit, ankle length.	X	X
c. Socks mans, wool, cushion sole, OG 408, stretch type.	X	X
d. Suspenders trousers, scissor back type.	X	X
e. Shirt cold weather, wool, nylon, flannel, OG 108.	X	X

<u>Item</u>	<u>Cold-Wet</u>	<u>Cold-Dry</u>
f. Trousers, cold weather wool serge, OG 108.	X	X
g. Trousers utility cotton sateen, OG 107.	X	X
h. Trousers, camouflage cotton nylon, water repellent white.	X	X
i. Liner cold weather trousers, nylon quilted, 6.2 oz, OG 106.		X
j. Liner, snow trousers, camouflage, nylon rip stop quilted white.		X
k. Boot extreme cold weather, mens rubber white w/release valve.		X
*l. Boot, cold weather, mens rubber, black, w/release valve.	X	
m. Coat cold weather mans, cotton and nylon wind resistant sateen.	X	X
n. Liner cold weather coat, nylon quilted, 6.2 oz, OG 106.	X	X
o. Parka, extreme cold weather, mans cotton/nylon oxford OG 107, wo/hood.		X
p. Liner extreme cold weather parka mans, nylon quilted, OG 106.		X
q. Cap, cold weather, cotton nylon oxford OG 107.	X	X
r. Hood extreme cold weather, cotton, nylon OG 107, w/fur ruff.		X
s. Handwear:		
(1) Mitten set arctic: Gauntlet style shell w/leather palm.	X	X

<u>Item</u>	<u>Cold-Wet</u>	<u>Cold-Dry</u>
**(2) Mitten shell, trigger finger, leather palm and thumb; mitten inserts, wool and nylon knit, OG, trigger finger.	X	X
**(3) Glove shells, work, leather; glove inserts, wool and nylon knit, OG 208.	X	X
(4) Gloves cloth, work type (anticontact).	X	X
t. Special purpose clothing items:		
(1) Parka snow camouflage, white.	X	X
(2) Trousers camouflage.	X	X
(3) Mask: Extreme cold weather.	X	X
(4) Dickey, rayon, OD (local item of issue).	X	X
(5) Balaclava, wool, navy blue (local item of issue).	X	X

*Not available to CRTC.

**Items not worn at same time.

TYPICAL COLD REGIONS FIGHTING LOAD, AND EXISTENCE LOADS,
SUPPLEMENTAL LOAD AND AHKIO LOAD

The following items should be carried or worn by all personnel during winter months while conducting cold regions winter operations.

The typical cold regions fighting and existence load may be modified to include new items of equipment and tailored to meet the tactical scenario. The combat loads shown are IAW instructions received from the Combat Developments Activity, Alaska. They are carried in or attached to the appropriate components of the All-Purpose Lightweight Individual Carrying Equipment (ALICE) IAW instructions contained in TC 10-19, dated 21 July 1976.

1. Fighting Load (carried on the person):

<u>Item</u>	<u>Quantity</u>
Cap, insulating, helmet liner/helmet	1
Helmet w/liner and camouflage cover	1
Undershirt, 50/50	1
Undershirt, cotton	As desired
Drawers, 50/50	1
Drawers, cotton	As desired
Socks, cushion sole	1
Suspenders, trousers	1
Trousers, cotton nylon, WR	1
Shirt, wool, OG 108	1
Boots, insulated	1
*Coat, cotton/nylon, w/liner	1
*Parka	1
*Liner, parka	1
Hood, winter	1
Muffler, wool	1
Mitten, set, arctic	1
Mitten, shell, trigger finger	1
Inserts, mitten, TF	1
Overwhites, set	1
Body armor	1
Individual weapon	1
**Skis w/poles	1
**Snowshoes	1
Grenade, M26A2	Per basic load
Bayonet w/scabbard	1
Canteen, arctic (full), w/cover and cup	1

<u>Item</u>	<u>Quantity</u>
Belt w/first aid packet and pouch	1
Pouch, ammo, w/ammo	2
Suspenders, pack, cbt	1
Protective Mask	1
Lipstick, antichap, cold climate	1
Sunglasses w/case	1
Box, match, waterproof w/matches	1
Personal items (i.e., cigarettes, matches, notebook, pencil, etc.)	As desired

*Either coat or parka or both depending upon temperature.

**One or the other but not both. Ski wax carried by two members of the team.

2. Existence Load (carried in rucksack):

<u>Item</u>	<u>Quantity</u>
Rucksack	1
Socks, cushion sole	2
Liner, trousers	1
Inserts, mitten, TF	1
Bag, sleeping, mtn	1
Bag, sleeping, arctic	1
Case, water repellent	1
Bag, waterproof	1
Mattress, pneumatic	1
Poncho	1
C-rations	1
Toilet articles	1
Towel, turkish	1
Strap, natural color	1
Face mask, extreme cold weather	1
*Climbers, ski	1
Intrenching tool w/cover	1

*For personnel wearing skis.

3. Supplemental Existence Load:

The following items are not immediately needed by the individual. They are normally carried in the duffle bag on unit transportation, and should be available when needed:

<u>Item</u>	<u>Quantity</u>
Undershirt, 50/50	1
Drawers, 50/50	1
Socks, cushion sole	3
Trousers, cotton nylon, WR	1
Shirt, wool, OG 108	1
*Parka, cotton nylon	1
*Liner, parka, nylon quilted	1
*Coat, cotton nylon/ w liner	1
*Mitten, set, arctic	1
*Mitten, shells, trigger finger	1
Skis w/poles, climbers, and wax, or snowshoes	1

*Temperature at time of mission will determine which of these items are worn, and which are carried in the supplemental load.

4. Ahkio Load:

a. Tent Group Equipment: A tent group is normally a squad size unit but may contain only the members of a tank crew or comparable size unit i.e., platoon or company, Cp or FDC.

b. The following is the tent group equipment for an infantry squad (10 EM): as outlined in FM 31-70, as amended. This load in a like new condition weighs approximately 160 kilograms with ahkio.

<u>Item</u>	<u>Quantity</u>
Sled, scow-type, 200 lb capacity (ahkio)	1
Ten-man tent	1
Yukon stove	1
Five gallon gasoline can (filled)	1
Five gallon water can (filled)	1
Cases of C rations	2
120-foot climbing rope	1
Gasoline lantern	1
Box of candles	1
Squad cook sets	2
One burner squad stoves	2
Axe	1
Saw (Buck or Swede)	1
Machete w/sheath	1
D handle shovel	1
Ski repair kit	1

APPENDIX C

CHECK LISTS

1. Preparation for Test

1.1 Facilities

- 1.1.1 Test courses measured and marked.
- 1.1.2 Heated enclosure has sufficient space and suitable furnishing.
- 1.1.3 Field shelter is heated and has adequate space.
- 1.1.4 Instrumentation items available.

1.2 Personnel

- 1.2.1 Trained in use of snowshoes.
- 1.2.2 Briefed on test.

1.3 Test Item

- 1.3.1 Shipping damage inspection completed.
- 1.3.2 Inventory completed.
- 1.3.3 Identification numbers permanently marked on each snowshoe.

2. Performance Test

2.1 Physical Characteristics

- 2.1.1 All test items inspected.
- 2.1.2 Each snowshoe weighed.
- 2.1.3 Length and width of each snowshoe measured.
- 2.1.4 Area of three (3) snowshoes measured.
- 2.1.5 Shovel height of each snowshoe measured.

2.1.6 Length and width of window of each snowshoe measured.

2.2 Structural Strength

2.2.1 Transverse Loading.

2.2.1.1 Total load (test participant and pack) is 145kg (320 lbs).

2.2.1.2 Supports properly positioned.

2.2.1.3 Window height measured before, during, and after loading for three snowshoes.

2.2.2 Longitudinal loading.

2.2.2.1 Total load is 145 kg (320 lbs).

2.2.2.2 Supports properly positioned.

2.2.2.3 Height measured each 15 cm from front support on both sides before loading.

2.2.2.4 Height measured during loading.

2.2.2.5 Height measured after load removed.

2.2.2.6 Repeat 2.2.2.1 through 2.2.2.4 for two additional snowshoes.

2.3 Compatibility

2.3.1 Bindings

2.3.1.1 Standard bindings installed and inspected.

2.3.1.2 Special bindings (if furnished) installed and inspected.

2.3.1.3 Size 13 wide VB boots attached and inspected.

2.3.1.4 Size 5 narrow VB boots attached and inspected.

2.3.1.5 Twelve test participants perform 200-meter walk with VB boots on snowshoes.

2.3.1.6 Size 13 wide and 5 narrow ski-mountain boots attached and inspected.

2.3.1.7 Twelve test participants perform 200-meter walk with ski mountain boots on snowshoes.

2.3.1.8 Size 13 wide and 5 narrow combat boots attached and inspected.

2.3.1.9 Twelve test participants perform 200 meter walk with combat boots on snowshoes.

2.3.2 Field Load

2.3.2.1 Ten pair snowshoes attached to field loads and inspected.

2.3.2.2 Ten test participants foot march 4 kilometers with snowshoes attached to field load.

2.3.2.3 Compatibility with field load evaluated after the foot march.

2.3.3 Jumping

2.3.2.1 Ten pairs snowshoes attached to ALICE and inspected.

2.3.2.2 Ten paratroops don ALICE with snowshoes and inspected.

2.3.2.3 Two jumps from 400 meters by the 10 paratroops and evaluated.

3. Functional Suitability

3.1 Prior To Each Exercise

3.1.1 Snow classified.

3.1.2 Snow temperature measured.

3.1.3 Snowshoes cleaned.

3.1.4 Bindings inspected.

3.1.5 Boot attachment inspected.

3.2 After Each Exercise

3.2.1 Questionnaires completed.

3.2.2 Equipment inspected.

